vation of a patient's response to the medical program for toxic megacolon. The decision to operate or persevere in medical management should be based on the response to therapy rather than an arbitrary time limit.

Frequent clinical and x-ray evaluations of the colonic dilatation, leukocyte counts and vital signs enable a clinician to monitor response to therapy. If within 24 to 48 hours no improvement is noted (that is, decreasing diameter of the dilated colon, reduction in fever and reduction in the leukocyte count and tachycardia) colectomy is indicated. If the colon continues to dilate, in spite of adequate medical management including nasogastric decompression, colectomy should be carried out as soon as possible.

The morbidity and mortality of fulminant ulcerative colitis and toxic megacolon remain excessively high.[2] Recognition of the importance of early diagnosis of the fulminant disease, of the various factors which contribute to megacolon, and of the necessity for effective and appropriate therapy should help to improve this.

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Regulating Acupuncture in Nevada

ELSEWHERE in this issue of the JOURNAL, Dr. William Edwards has presented a report on the current status of acupuncture and Oriental medicine in the state of Nevada. The article well describes what progress has been made since an earlier article appeared in these pages in June 1974.

Acupuncture in Nevada has not turned out to be the pot of gold that was envisioned by its strongest proponents, those who played a major part in getting the necessary legislation quickly passed by the Nevada State Legislature. Acupuncture is far from emulating the historic mother lode in silver and gold strikes of Virginia City, or the modern gambling take of "Glitter Gulch" in Las Vegas.

As patients found that acupuncture was not the panacea it had been loudly proclaimed to be in the lobbying, and that its cost was far from modest, the rush quickly tapered off. Also, it soon became evident that complications such as accidental pneumothorax, hematomas and persistently painful puncture wounds really happened.

It is to the credit of our governor and the Board of Oriental Medicine appointed by him that both have acted responsibly to prevent the development of a real racket. This might have occurred even without violation of the loose and incomplete law that the Legislature rushed through. There are several possible loopholes and faults in the law that the Legislature has not corrected, but the appointed Board of Oriental Medicine has formulated rules so that these could not be exploited. A less conscientious board might well have permitted a great deal of public exploitation for private gain.

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Manpower Necessary to Perform Quality Echocardiography

IN THE current issue of the JOURNAL there is an excellent review of the uses of echocardiography in congenital heart disease by Drs. Moss, Gussoni and Isabel-Jones. Echocardiography, which is the use of ultrasound to record the location and motion of cardiac structures in a noninvasive manner, is playing an increasingly important role in the diagnosis of various heart diseases. As indicated in this article, one of the major uses for this diagnostic tool is in the management of patients with congenital heart disease. While reading this article, I was impressed with the amount of technical detail mentioned by the authors. It seemed as though they were constantly reminding the reader of possible technical difficulties and of the care with which the examination had to be carried out. These comments are not only pertinent and important but I would like to enlarge on them.

Echocardiography is frequently described as simple. As far as the patient is concerned, this may be true. There is virtually no discomfort for the patient, and as best we can determine there is absolutely no hazard from the examination. On

the other hand the amount of skill and expertise necessary to obtain and interpret an echocardiogram is increasing constantly. Not too many years ago the mere identification of the anterior leaflet of the mitral valve was sufficient to call oneself an echocardiographer. Now we not only record echoes from many more areas of the heart than the mitral valve, we might even ask which echo from the anterior leaflet of the mitral valve did one wish to record. As with practically everything else, time and experience make nothing simpler, only more complicated. At present, echocardiography has become a very sophisticated diagnostic technique which requires a great deal of knowledge and skill in both the examination and the interpretation. Merely wanting echocardiography to "make the diagnosis of mitral stenosis and pericardial effusion" can no longer be justified. As indicated in the article in this issue of the JOURNAL, echocardiography can do much more than this and clinicians will expect this added information from their echocardiographic laboratories.

The question as to how one makes certain that this type of echocardiographic expertise is available for those patients and clinicians who might benefit from this diagnostic tool, points out a serious problem of education and training in echocardiography. This problem is probably the single most important one facing echocardiography. It is obvious that with any new diagnostic procedure unless it is in the hands of people who are well trained and conscientious, the technique will undoubtedly be abused or used improperly, and the entire technique could fall into disrepute.

The enthusiasm and popularity of echocardiography has been too rapid for an orderly growth and development of the field. So many people want to do the examination or have the technique available that the people in the field can not possibly train all of those who want to develop these skills. In the early days of echocardiography it was merely a matter of visiting an active echocardiographic laboratory for a few weeks or less to learn all that was known about the examination. A laboratory might have only one or two visitors at a time and it was relatively easy to give personal attention to these trainees. Now we have the double problem of having too much to teach and far too many persons wanting this instruction. This is a serious problem because some people are obviously not waiting for such instruction or are taking very superficial courses as their basis for beginning a laboratory.

Echocardiography has certainly become as sophisticated a technique as cardiac catheterization. The examination may not have the same hazards with respect to the patient; however, the technical skills that one must learn in manipulating a transducer are very similar to those necessary in manipulating catheters. Certainly the interpretation of an echocardiogram can clearly be as sophisticated as the interpretation of hemodynamic or angiographic data. When an institution wants to set up a catheterization laboratory, ordinarily a person who is formally trained in the various catheterization techniques would be sought, usually as part of a fellowship program. I believe that we are fast approaching a similar situation with echocardiography. There are many excellent echocardiographic laboratories in major teaching centers that are producing well trained echocardiographers who have received closely supervised instruction. Again this instruction is primarily a part of a cardiology fellowship program. It would be almost impossible for any practicing physician currently to obtain this type of training. Thus if an institution wanted to start an echocardiographic laboratory, one of these formally trained physicians who has the endorsement of the physician in charge of his education should probably be sought to run that laboratory.

Although the supply of such trained echocardiographers should increase significantly in the next few years, many institutions and physicians do not want to wait to obtain such a person, and they are trying to obtain echocardiographic training for practicing physicians. This is becoming an increasingly difficult chore. I know of no institution which will provide any lengthy or intensive training in echocardiography for practicing physicians. Such a course would require a minimum of a three-month experience at an institution in which the trainee would do four to five echocardiograms a day and interpret an even larger number under the direct supervision of an accomplished echocardiographer. This is essentially the experience that cardiology fellows obtain at present. Even if physicians could afford to give up three months of their time, it is doubtful that many laboratories would permit such use of their institution because of their commitment to their own cardiology fellows.

The only type of training that is available to practicing physicians who want to do echocardiography is some short workshop session in which they learn the basic principles of echocardiog-

raphy. These courses usually last less than a week and the students examine eight to ten patients during that time. There is absolutely no possibility that one can become a trained echocardiographer with that type of experience. If, on the other hand, such a person is willing to continue his self-education after returning to his home institution, then it may be possible to gradually gain more experience and more confidence with the technique. Because there is no one available for critical evaluation of the student's examinations and interpretation, the length of time necessary to become proficient will naturally take longer than with a formal program. Obviously some persons learn faster than others, but it is highly unlikely that one could become a competent echocardiographer in less than 6 to 12 months with this type of training experience. As more and more details need to be learned with this technique, this largely self-educational approach is becoming less and less feasible. So in the very near future there should be a decreasing number of self-trained physicians entering the field and an increasing reliance on physicians who are formally trained.

The problem of education and training is not limited to physicians. It is well recognized that nonphysicians can make excellent echocardiographic technicians. Since the examination itself is not hazardous to the patient, technologists can do the echocardiographic examination and frequently can do the examinations better than physicians. It should be obvious that the type of technician doing this examination must be well versed in cardiac anatomy, physiology and pathology. This type of examination is not similar to taking an electrocardiogram or chest roentgenogram. One does not merely place leads at various areas of the chest or put the patient against a roentgenograph and push a button or turn the dial to the appropriate electrocardiographic leads. An echocardiographic examination is a very customized procedure. The examination of each patient is slightly different. The direction of the ultrasonic beam has to be carefully adjusted in order to record the desired echocardiographic information. An echocardiographic technician knows that the transducer is properly directed when he can identify the structures that he is recording on the oscilloscope. The better the cardiological background of this person, the better prepared he will be to understand as well as recognize an abnormal situation. As pointed out in the article written by Dr. Moss and associates, the technical details are even more important in congenital heart disease—especially in patients in whom pronounced distorted cardiac anatomy is present. Therefore it is obvious that any technician doing echocardiography, especially the examination of a complex congenital problem, must be well versed in normal as well as abnormal cardiac anatomy and physiology.

The training of such echocardiographic technicians is currently more of a problem than trying to produce a supply of physicians educated in echocardiography. There are very few, if any, formal training programs producing echocardiographic technicians. There are several technical training programs over the country where echocardiography is taught along with other diagnostic ultrasound procedures. These training programs are primarily geared to put out technologists who have a superficial knowledge of all ultrasonic procedures. To date such programs have been grossly inadequate with respect to echocardiography. In addition these programs have not prepared these people to function in a cardiovascular laboratory where they must also be knowledgeable in other cardiological tests such as phonocardiography and pulse tracings. There are a few schools in which cardiovascular or cardiopulmonary technology is taught. Some of these schools apparently have training in echocardiography; however, the quality of training in these programs has yet to be determined. Until now most of the echocardiographic technologists have been trained by the individual physicians with whom they work. This on-the-job training has been highly successful in many situations but it is obviously not satisfactory to meet the national need for these people. Thus some type of formal training for technologists who can carry out high quality echocardiography must be devised soon.

There is no question that without an adequate supply of highly skilled, well trained physicians and technologists, clinicians and patients will not be able to receive the full benefit of some of the echocardiographic diagnoses mentioned by Dr. Moss and his associates. This problem is being recognized by an increasing number of echocardiographers and it is to be hoped that soon some practical solutions will be forthcoming.

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